REMARKS

The Examiner has objected to the drawings, alleging that Figure 2 does not show the claimed feature of claim 1 of "between an input of the original signal decision unit and the decided original signal". Fig. 2 is modified to show that the output z(n) of equalizer 20 is provided to the carrier recovery unit and phase lock detector 24..

The Examiner has objected to the Abstract as being longer than the allowed 150 words. The new Abstract complies with the Examiner's requirement.

Claims 1, 2, 5, 6 and 9 are rejected under 35 U.S.C. § 103 as being unpatentable over Murakami et al (U.S. Patent No. 6,678,317) in view of Shiue et al (U.S. Patent No. 5,712,873).

Claims 3 and 7 are rejected under 35 U.S.C. § 112, first paragraph.

Claims 4 and 8 are objected as being dependent upon a rejected claim, but otherwise are allowable. Applicant thanks the Examiner for indicating that claims 4 and 8 are directed to allowable subject matter.

Claim Rejections Under 35 U.S.C. § 103

In rejecting claims 1, 2, 5, 6 and 9 as being unpatentable over Murakami et al in view of Shiue et al, the Examiner provides reasoning purporting to show that Murakami et al teaches all of the elements of claim 1, except an adaptive equalizer having a feed forward filter and a decision feedback filter and a phase lock signal provided to the adaptive equalizer. To make up for these deficiencies, the Examiner states, "Shiue et al's adaptive equalizer requires a re-rotator input into the decision feedback equalizer for the purpose of de-rotating the decision unit output

signal so that the decision feedback filter output may be added to the feed forward filter output signal." The Examiner concludes that the invention defined by claim 1 is therefore rendered obvious by the combination of Murakami et al and Shiue et al. Applicant respectfully traverses this rejection.

First, one of the elements of claim 1 is:

> "a coefficient updating unit for receiving the phase lock signal from the carrier recovery and phase lock detecting unit and the restored signal from the re-rotator unit, generating an error for updating the coefficients of the equalizer, and updating the coefficients of the equalizing unit."

The Examiner admits that Murakami et al does not call for a phase lock signal provided to the equalizer, but he does not explain how Shiue et al provides a phase lock signal to the equalizer. Applicant submits that there is no teaching in Shiue et al with respect to providing the equalizer with a phase lock signal.

Second, the combination in claim 1 recites an equalizing unit which operates by a self-recovering equalization algorithm in an initial stage and by a decision directed equalization algorithm after a predetermined time has lapsed. Neither Murakami et al nor Shiue et al teaches or suggests changing the operation of an equalizing unit after a predetermined time has lapsed. More specifically, Murakami describes that the operation of the adaptive equalizer 4a switches from a first mode (CMA method) to a second mode (DD method) when the absolute value a of the carrier frequency error becomes smaller than the reference value b (column 10, lines 42-63, and particularly lines 53-54).

In fact, Murakami teaches away from changing the operation of the equalizing unit after a predetermined time. Column 5, lines 43 to column 6, lines 12 describes several disadvantages for switching the operation of an equalizing unit after a predetermined time has lapsed. However, because of the unique combination of elements defined by the invention of claim 1, certain of the disadvantages of the prior art can be overcome. For example, a loop bandwidth of a carrier recovery and phase lock detecting unit can be made wide during initial operation to provide a smaller remaining error (see, for example, page 10, lines 11+).

Applicant submits that claims 2, 5 and 6 are allowable at least by virtue of their dependence from claim 1, and that claim 9 is allowable at least because the applied references do not teach or suggest determining whether the output from the phase lock detector is a frequency offset release signal or a frequency offset capture signal.

Claim Rejections Under 35 U.S.C. § 112

In rejecting claims 3 and 7 under 35 U.S.C. § 112, first paragraph, the Examiner states that Applicant discloses a fixed constant decided according to a maximum power of constellation of the signal is used as a maximum output from adder 206 (specification page 7, lines 19-21). The Examiner states, however, that Applicant fails to show how a constellation's maximum power is used to generate the fixed value.

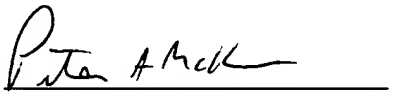
Applicant submits that the specification, at page 7, lines 18-21, describes that the output from the adder 206 of Figure 3 is limited to be a fixed value or less. The specification describes that the fixed value is decided according to a maximum power of constellation of the signal. This means that the fixed value would be the absolute value of the highest data value in the

constellation. That is, the fixed value would be the highest value expected in the data signal. In view of this, Applicant submits that the specification shows how a constellation's maximum power is used to generate the fixed value, and respectfully requests the Examiner to withdraw the rejection of claims 3 and 7 under 35 U.S.C. § 112, first paragraph.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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